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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT	:	Dmitri Loguinov		
SERIAL NO.	:	09/923,868	EXAMINER	: Chirag G. Shah
FILED	:	August 6, 2001	ART UNIT	: 2664
FOR	:	METHOD FOR SUPPORTING NON-LINEAR, HIGHLY SCALABLE INCREASE-DECREASE CONGESTION CONTROL SCHEME		

APPEAL BRIEF TRANSMITTAL LETTER

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Dear Sir:

Appellants respectfully submit three copies of an Appeal Brief For Appellants that includes an Appendix with the pending claims. The Appeal Brief due January 28, 2006 is now due on February 28, 2006 with a one-month extension of time.

Appellants enclose a check in the amount of $500.00 covering the requisite Government Fee.

Should the Examiner deem that there are any issues which may be best resolved by telephone communication, kindly telephone Applicants undersigned representative at the number listed below.

Respectfully submitted,
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Registration No. 48,027

By: Steve Cha
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Date: February 27, 2006

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(Name of Registered Rep.)

(Signature and Date)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

In re the Application

Inventor	:	**Dmitri Loguinov**
Application No.	:	**09/923,868**
Filed	:	**August 6, 2001**
For	:	**METHOD FOR SUPPORTING NON-LINEAR, HIGHLY SCALABLE INCREASE-DECREASE CONGESTION CONTROL SCHEME**

APPEAL BRIEF

On Appeal from Group Art Unit 2664

Aaron Waxler
Registration No. 48,027

Date: 2/27/06

By: Steve Cha
Attorney for Applicant
Registration No. 44,069

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Steve Cha, Reg. No. 44,069
(Name of Registered Rep.)

(Signature and Date)

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest is the assignee of the present application, U.S. Philips Corporation, and not the party named in the above caption.

II. RELATED APPEALS AND INTERFERENCES

With regard to identifying by number and filing date all other appeals or interferences known to Appellant which will directly effect or be directly affected by or have a bearing on the Board's decision in this appeal, Appellant is not aware of any such appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-40 have been presented for examination. All of these claims are pending, stand finally rejected, and form the subject matter of the present appeal. The claims with status "original" are 8, 14, 15, 21, 23, 25, 34 and 36. The remaining claims on appeal have the status "previously presented."

IV. STATUS OF AMENDMENTS

The Amendment after the Final Office Action filed October 20, 2005 has not been entered. As stated in the first paragraph of the remarks, the amendment merely removes a typographical error from claim 40, a single mistyped character, an equal sign. As further mentioned in that paragraph, the amendment of claim 40 intended to put the claims in better form for appeal. The next paragraph states that this amendment of claim 40 adopts the suggestion of the Examiner in the previous Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

A method for providing congestion control in a communications network involves transmitting a plurality of serial data transmission from a source node 12a, 12b, 18 to a destination node 16a, 16b, 22 (FIG. 1). A determination is made as to whether congestion occurs in the network (page 8, lines 4, 9 and 10). A bandwidth capacity C of the network is determined (page 11, lines 7-16, which refer to, and incorporate by reference, U.S. Patent Publication No. 2002/0169880, i.e., the '880 publication). The bandwidth capacity C is preferably a bottleneck bandwidth, "which represents the speed of the slowest link of an end-to-end path" ('880 publication, [0004], last sentence). One method for determining the bottleneck bandwidth is to transmit a packet of size s_2 and to notice its temporal spacing ΔT to the previous packet upon arrival at the destination. The bottleneck bandwidth is determined, for example, according to the expression $s_2/\Delta T$ ('880 publication, [0005], [0006]). The '880 publication calculates an improved bottleneck bandwidth, as another example ('880 publication improves upon this method ([0026]). The receiver calculates the bottleneck bandwidth, i.e., the bandwidth capacity ('880 publication, [0006], [0026]. Based on the determined bandwidth capacity, congestion feedback information is generated (page 5, lines 13-15). The feedback information is then transmitted to the sender to determine a congestion state (page 5, lines 13-15). The sender rate at which the source is currently transmitting the data is adjusted according to a first function of the determined bandwidth capacity if no congestion occurs (page 11, lines 17-22). Conversely, if congestion occurs, the sender rate is adjusted according to a second function (page 11, lines 17-22; page 12, lines 15-17). Both functions are functions of the determined bandwidth capacity C (page 11, lines 17-22).

A first advantage of these two functions, is improved convergence to fairness (page 8, line 18 - page 9, line 6). A second advantage of these two functions is the ability to support a large number of simultaneous flows over the same bottleneck link without experiencing excessive packet loss (page 9, lines 6-10). A third advantage of the present invention is the ability to maintain a constant packet loss to thereby reliably afford a designated quality of service (QoS) (page 10, line 11 - page 11, line 6).

In another aspect, both the sending rate at which said source node is currently transmitting data to said network and the current rate at which said destination node is currently receiving data are monitored to determine whether a congestion state occurs. If it does not occur, the bandwidth capacity is determined. In either event, respective predetermined criteria are used to decrease or increase the sender rate, respectively, based on the occurrence or non-occurrence of the congestion state (page 8, lines 11-17, page 17, lines 1-13).

In an additional aspect, increase of the number of packets transmitted by said source node is at a first rate, and at a second rate if a predetermined range of the determined bandwidth capacity is utilized (page 13, lines 4-9).

In a further aspect, in calculating each of the first and second functions, the sender rate is raised to a power exceeding unity (page 3, formula 3; page 11, lines 17-22; page 12, lines 16-17).

In an alternate aspect, increasing and decreasing the sender rate above and below an operating point for the network provides a maximum throughput at minimum delay time (page 12, line 21 - page 13, line 3).

In an extra aspect, the sender rate is non-linearly increased, and returned to a linear rate when a predetermined percentage of the determined bandwidth capacity is utilized within the network (page 13, lines 4-16).

In yet another aspect, a congestion state occurs if the rate permitted by the destination node exceeds the capacity of the source node (page 12, line 21 - page 13, line 4).

VI. GROUNDS FOR REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection to be reviewed on appeal are:

whether claims 19, 20 and 25 stand invalidly rejected under 35 U.S.C. 102(e) as anticipated by U.S. Patent No. 6,850,488 to Wesley et al. ("Wesley");

whether claims 1-3, 5, 8-10, 14-16, 21-23, 26-28, 30, 33, 34, 36, 37 and 40 stand invalidly rejected under 35 U.S.C. 103(a) as unpatentable over Wesley in view of U.S. Patent No. 6,577,599 to Gupta et al. ("Gupta");

whether claims 4, 11 and 29 stand invalidly rejected under 35 U.S.C. 103(a) as unpatentable over Wesley in view of Gupta and U.S. Patent No. 6,400,686 to Ghanwani et al. ("Ghanwani"); and

whether claims 6, 7, 12, 13, 17, 18, 24, 31, 32, 35, 38 and 39 stand invalidly rejected under 35 U.S.C. 103(a) as unpatentable over Wesley in view of Gupta and what the Office Action characterizes as admitted prior art on pages 2 and 3 of the present specification ("AAAPA").

VII. ARGUMENT

Anticipation rejection of claims 19, 20 and 25

Claims 19, 20 and 25 stand rejected under 35 U.S.C. 102(e) as anticipated by U.S. Patent No. 6,850,488 to Wesley et al. ("Wesley").

Claim 19 recites:

> means for determining a bandwidth capacity of said network;
> means for generating congestion feedback information based on the determined bandwidth capacity of said network to determine a congestion state; and,
> means for adjusting said sender rate at which said source node is currently transmitting the data based on said congestion feedback information, the adjusted rate being a function of said determined bandwidth capacity of said network

Wesley fails to disclose or suggest this aspect of the present claim 19.

First, Wesley fails to disclose or suggest, "determining a bandwidth capacity."

The final Office Action (hereinafter "Office Action") cites to lines 56-67 of column 3 in Wesley. The Office Action also cites to Wesley claim 1, but the appellants believe this second citation adds nothing to further the argument of the Office Action.

This passage at lines 56-67 of column 3 in Wesley states that receivers return feedback messages to the sender if any of the receivers experience congestion. "The congestion condition is defined with respect to a sampling window. For example, a congestion condition may be defined as a certain percentage of the packets within the sampling window being lost" (col. 5, lines 41-44). A stream of packets includes a sampling window defined between a packet having a begin sampling window sequence

number and a packet having an end sampling window sequence number (col. 2, lines 13(14)-19). Computation of the percentage of lost packets in the window potentially gives rise to feedback information, returnable in feedback messages, if the computed percentage exceeds the certain percentage (col. 2, lines 34-37; col. 4, lines 8-20). Thus, given a window of n packets, there exists some k such that if k packets are lost, a congestion condition does not exist; but, if k+1 are lost, a congestion condition exists. If by this test, a congestion condition is determined to exist, the receiver returns the feedback message and the sender may reduce its rate of transmission; conversely, if feedback information from the receivers 116 through 127 indicates that none of the receivers has determined a congestion condition to exist, the sender may increase the rate of transmission (col. 4, lines 32-45; col. 5, lines 27-40). Wesley is silent as to how the sender rate is increased or decreased. It is unclear whether, for example, the increase/decrease is a random number, a constant, etc. The magnitude of the increase/decrease is also unclear.

<u>At best, Wesley suggests recognizing, if a congestion condition exists, that the sender rate exceeds an unknown bandwidth capacity</u>. For example, let us say that the Wesley sender is transmitting at sender rate x, and decides, based on feedback of no congestion condition, to increase the sender rate to x + k. Let us further assume that, as a result, the packet loss percentage now exceeds the certain percentage. This does not amount to "<u>determining</u> a <u>bandwidth capacity</u>" at least because you do not know whether your capacity is x + k/2, x + k/3, x +3k/4, etc.

Also, claim 19 recites, ". . . generating congestion feedback information <u>based on</u> the <u>determined bandwidth capacity</u> of said network <u>to determine</u> a congestion

state. . ." Since it is the Wesley receiver that generates feedback information, the immediately-above-quoted language of claim 19 would imply that the receiver is in possession of "the determined bandwidth capacity," but, as set forth above, the Wesley receiver merely calculates a packet loss percentage. Wesley does not disclose or suggest, ". . . generating congestion feedback information based on the determined bandwidth capacity of said network to determine a congestion state. . ."

In addition, claim 19 recites, ". . . the adjusted rate being a function of said determined bandwidth capacity." Wesley fails to disclose or suggest that any increase or decrease in the sender rate is a function at all. A random number, for instance, is not a function; likewise, an adjusted rate based on a random number is not a function. Nor, as set forth above, does Wesley disclose or suggest a "determined bandwidth capacity," much less "said determined bandwidth capacity" in the context of claim 19.

Item 5 of the Office Action states, in the paragraph bridging pages 3 and 4, "the receivers return feedback messages to sender if any of the receivers experience congestion while receiving the stream of packets, thus indicating the receiver determines the bandwidth capacity of the network by sending a feedback to the sender having information indicating that the capacity of link has been exceeded in the network.

Before addressing the above quotation from the Office Action, the appellant observes that neither the word "bandwidth" nor the word "capacity" appears anywhere in Wesley.

As to the above quotation from the Office Action, the appellant finds no support for the underlined portion. Wesley does not disclose or suggest that the packet loss percentage determined by the receiver amounts to "determining a bandwidth

capacity;" instead, if the determined percentage exceeds the certain percentage, the resulting feedback message would indicate to the sender that the current sender rate exceeds an unknown bandwidth capacity. Wesley additionally fails to disclose or suggest, ". . . the adjusted rate being a function of said determined bandwidth capacity."

In addition, to the best understanding of the appellant, the Office Action seems to imply that a Wesley receiver "determines" bandwidth capacity by performing the act of sending feedback information to the sender as a consequence of finding that the certain percentage is exceeded (see Office Action, page 4, lines 1-3). The Office Action further apparently suggests that the "congestion feedback information" of claim 19 equates to the Wesley "feedback information" which "includes an identifier for the sampling window as well as other feedback information" (Wesley, col. 5, lines 45-47; Office Action, page 4, first full paragraph). It is accordingly unclear in what sense the Office Action deems Wesley to disclose ". . . generating feedback information based on the determined bandwidth capacity. . ."

In addition, the suggestion by the Office Action that sending the feedback information to the Wesley sender 102 somehow "determines" "bandwidth capacity" contradicts the temporal ordering of events implied by claim 19. Claim 19 recites, ". . . generating congestion feedback information based on the determined bandwidth capacity of said network to determine a congestion state. . ." It is the Wesley receiver, rather than the sender, that determines a congestion state (col. 5, lines 42-44: "a congestion condition may be defined as a certain percentage of the packets within the sampling window being lost"; col. 5, lines 2-4: "the receivers do not have to determine if a congestion condition exists until after receiving the end sample packet"). The interpretation by the Office

Action would therefore seemingly imply that the Office Action regards Wesley as "determining a congestion state" before Wesley determines "bandwidth capacity." Not only does this interpretation by the Office Action contradict the temporal ordering of events implicit in the claim 19 language -- this interpretation by the Office Action leaves one to wonder at what point, and by what mechanism, Wesley ultimately does "determine" bandwidth capacity. If the Office Action sees the Wesley "determination" of "bandwidth capacity" as including the resulting adjustment to sender rate, such an interpretation by the Office Action runs into the additional difficulty of the claim 19 language ". . . the adjusted rate being a function of said determined bandwidth capacity of said network."

The Office Action also incorrectly states, "congestion condition inherently occurs based on determined bandwidth capacity threshold" (page 4, first paragraph).

In actuality, however, the Wesley congestion condition occurs for a given receiver if the packet loss percentage the receiver calculates exceeds the certain percentage (col. 5, line 43: "certain percentage"; col. 5, lines 42-44: "a congestion condition may be defined as a certain percentage of the packets within the sampling window being lost"; col. 5, lines 2-4: "the receivers do not have to determine if a congestion condition exists until after receiving the end sample packet").

In particular, the immediately-above-quoted statement by the Office Action (page 4, first paragraph) appears to equate the Wesley "certain percentage" to what the Office Action characterizes as a "determined bandwidth capacity threshold." Notably, claim 19 does not refer to such a threshold, or to any threshold.

Perhaps, this statement by the Office Action indicates that the Office Action mistakenly suggests that the Wesley calculated packet loss percentage corresponds to the "determined bandwidth capacity" of claim 19.

However, the appellant submits it is unable to see any support in Wesley for the proposition that a given packet loss percentage detected at a receiver determines, much less equates to, a particular bandwidth capacity (see also instant specification, page 4, lines 10-11).

Moreover, if, due to an increase in Wesley sender rate, the packet loss at a particular receiver jumps by 2 packets per window or 4 packets per window, it is unclear that any resulting perhaps random decrease in the sender rate amounts to ". . . the adjusted rate being a function of said determined bandwidth capacity."

It is also unclear whether the 2-packet jump is deemed to indicate a different "bandwidth capacity" than the 4-packet jump.

Likewise, it is unclear in what sense the "bandwidth capacity" is "determined."

At best, Wesley suggests recognizing, if a congestion condition exists, that the sender rate exceeds an unknown bandwidth capacity.

It is at least conceivable that the Office Action, instead, mistakenly intends to equate its "determined bandwidth capacity threshold," i.e., the Wesley certain percentage, with "said determined bandwidth capacity" of claim 19 (see Office Action, page 4, second full paragraph, last sentence).

In response, the appellant submits it is unable to see any support in Wesley for the proposition that a given packet loss percentage threshold at a receiver determines,

much less equates to, a particular bandwidth capacity or even an upper limit on bandwidth capacity (see also instant specification, page 4, lines 10-11). Although the threshold may be useful in deciding that a congestion state exists for a given receiver, Wesley does not disclose or suggest that the "certain percentage" corresponds to a bandwidth capacity. Nor, under such an interpretation, is it clear how Wesley can fairly be construed as having the characteristic of ". . . the adjusted rate being a function of said determined bandwidth capacity." In addition, under such an interpretation, the "congestion feedback information" presumably would correspond to the binary determination of congestion for a given receiver. It is therefore unclear by what reasoning Wesley is deemed to disclose ". . . generating congestion feedback information based on the determined bandwidth capacity of said network to determine a congestion state. . ."

From the sentence in the Office Action bridging pages 3 and 4, it seems also conceivable that the Office Action equates the determination of congestion, or no congestion, for a receiver to "said determined bandwidth capacity" of claim 19. However, a mere binary determination cannot properly be regarded as "said determined bandwidth capacity" of claim 19. In addition, claim 19 recites, ". . . generating congestion feedback information based on the determined bandwidth capacity of said network to determine a congestion state. . ." This language from claim 19 contradicts the proposition that the determination of congestion, or no congestion, for a receiver equates to "said determined bandwidth capacity" of claim 19.

Next, the Office Action incorrectly quotes the language of claim 19. The second full paragraph on page 4 of the Office Action states, "... the adjusted rate being a function of the determined the bandwidth capacity of said network."

The actual claim language is "... the adjusted rate being a function of said determined bandwidth capacity of said network."

The remaining comments by the Office Action are believed to have been addressed above.

The Advisory Action refers to lines 27-35 of column 5 in Wesley, but nothing in this passage seems to advance the position of the Office Action, or clarify such position.

The Advisory Action suggests, in connection with Wesley, that "the congestion condition . . . indicates that the bandwidth capacity of the network . . . does not support . . . the current rate."

However, the "bandwidth capacity" in this statement by the Advisory Action is an unknown bandwidth capacity. In particular, knowledge, in Wesley, that an unknown bandwidth capacity has been exceeded does not amount to ". . . determining a bandwidth capacity" which language explicitly appears in the present claim 19.

In addition, the Advisory Action fails to address the above-discussed contradiction between the Office Action's interpretation and the ordering of steps implied by the claim 19 language, ". . . generating congestion feedback information based on the determined bandwidth capacity of said network to determine a congestion state. . ."

For at least all of the above reasons, Wesley fails anticipate the present invention as recited in claim 19.

Nor does the appellant see any obvious modification of Wesley to resemble the present claim 19.

Claims 20 and 25 depend from base claim 19 and are deemed to be patentable over Wesley at least due to their dependency.

Obviousness rejection based on Wesley in view of Gupta

Claims 1-3, 5, 8, 26-28 and 30

As to claim 1, Wesley fails to disclose or suggest, "determining a bandwidth capacity." This is discussed above with regard to claim 19.

As the Office Action acknowledges, Wesley also fails to disclose or suggest:

> (d) adjusting a sender rate at which said source is currently transmitting the data according to a first function of the determined bandwidth capacity if no congestion occurs; and,
> (e) adjusting said sender rate of said source node according to a second function if congestion occurs.

It is unclear, firstly, how Wesley is modified, in view of Gupta, to produce an embodiment that would feature "determining a bandwidth capacity."

Secondly, it is unclear how such an embodiment could be deemed to feature ". . . a first function of the determined bandwidth capacity."

Third, at least since Gupta is silent as to the nature of the increments or decrements to sender rate, Gupta does not disclose ". . . adjusting a sender rate at which said source is currently transmitting the data according to a first function of the determined bandwidth capacity if no congestion occurs. . ."

For at least the above reasons, the combination of references the Office Action proposes fails to render obvious the present invention as recited in claim 1.

Claim 26 is a system claim corresponding to method claim 1, and the same analysis applied above to claim 1 applies to claim 26.

Claims 2, 3, 5 and 8, and claims 27, 28 and 30, depend from base claims 1 and 26, respectively, and are deemed patentable at least due to their respective dependencies.

Obviousness rejection based on Wesley in view of Gupta

Claims 9, 10, 14, 33, 34 and 36

Claim 9 recites, ". . . (b) monitoring a sending rate at which said source node is currently transmitting data to said network and a current rate at which said destination node is currently receiving data to determine whether a congestion state occurs. . ."

Wesley fails to disclose "monitoring a . . . sending rate."

The Office Action cites to lines 27-40 of column 5 in Wesley. This passage states that ". . . the receiver sends feedback information . . ." The Wesley receiver does not monitor any rate; instead, the Wesley receiver detects packet loss and sends feedback information when the loss is sufficiently high. The Wesley sender receives the feedback information and accordingly adjusts, as appropriate, a sending rate. Wesley does not disclose that the sender and receiver, alone or in combination, monitor a rate, much less two separate rates, i.e., "a sending rate . . . and a current rate."

Gupta cannot make up for the shortcomings of Wesley.

In addition, claim 9 recites, "increasing said sender rate of said source node according to a first function of the determined bandwidth capacity."

It is unclear, for example, how the two references, alone or in combination, can be said to disclose or suggest a "determined bandwidth capacity."

For at least the above reasons, the combination of references the Office Action proposes fails to render obvious the present invention as recited in claim 9.

Claim 33 is software claim based on the method claim 9, and the analysis set forth above with regard to claim 9 applies to claim 33.

Claims 34 and 36 depend from base claim 33 and are deemed to be patentable at least due to their dependency.

Claims 10 and 14 depend from claim 9, and are deemed to be patentable at least due to their dependency.

Obviousness rejection based on Wesley in view of Gupta

Claim 22

Claim 22 recites:

> if no congestion occurs, said adjusting means increase the number of packets transmitted by said source node at a first rate and at a second rate if a predetermined range of the bandwidth capacity of said network is utilized.

The Office Action acknowledges that Wesley fails to disclose or suggest the above aspect of the present invention, but cites to lines 28-39 of column 11 in Gupta for disclosure of the underlined portion in the above quote.

However, this passage seemingly fails to make such a disclosure.

In fact, as seen at the top of page 11 in the Office Action, the Office Action apparently defers from offering a citation to any reference with respect to the

claim language, ". . . at a second rate if a predetermined range of the bandwidth capacity of said network is utilized."

For at least the above reasons, the cited combination of references fails to render obvious the present invention as recited in claim 22.

Obviousness rejection based on Wesley in view of Gupta

Claim 40

Claim 40 recites, ". . . a first function of a currently determined bandwidth capacity. . ."

As set forth above with regard to claim 19, Wesley fails to disclose or suggest "a determined bandwidth capacity."

Therefore, it is unclear, firstly, how Wesley is modified, in view of Gupta, to feature "a determined bandwidth capacity."

Secondly, neither reference discloses the nature of the sender rate increments or decrements, or any function used in adjusting the sender rate.

It is therefore, for at least these reasons, unclear how such an embodiment could be deemed to feature ". . . a . . . function of a . . . determined bandwidth capacity."

Obviousness rejection based on Wesley in view of Gupta

Claim 15

Claim 15 recites, ". . . a congestion state occurs if the rate permitted by said destination node exceeds the capacity of said source node."

Wesley fails to disclose or suggest this aspect of claim 15, at least because Wesley fails to disclose or suggest that the sender is configured for sending at a sending rate that exceeds its capacity. Instead, Wesley merely discloses that the sender "may"

reduce its sending rate (col. 4, line 40) or "may" decrease its sending rate (col. 4, line 43), presumably based on its own capacity limitations.

Likewise, Gupta "may" increase its sender rate (col. 11, line 35(36)), subject presumably to its own capacity limitations.

In addition, since claim 15 depends from claim 9, it is deemed to distinguish patentably over the applied references for at least the reasons set forth above with regard to claim 9.

For at least the above reasons, the references applied by the Office Action fail to render obvious the present invention as recited in claim 15.

Obviousness rejection based on Wesley in view of Gupta

Claim 21

Claim 21 recites, ". . . monitoring said sending rate at which said source node is currently transmitting data to said network and a current rate at which said destination node is currently receiving data to generate said congestion control information."

Wesley fails to disclose ". . . monitoring said sending rate. . ."

The Office Action cites to lines 27-40 of column 5 in Wesley. This passage states that ". . . the receiver sends feedback information . . ." The Wesley receiver does not monitor any rate; instead, the Wesley receiver detects packet loss and sends feedback information when the loss is sufficiently high. The Wesley sender receives the feedback information and accordingly adjusts, as appropriate, a sending rate. Wesley does not disclose that the sender and receiver, alone or in combination, monitor a rate, much less two separate rates, i.e., "a sending rate . . . and a current rate."

Gupta cannot make up for the shortcomings of Wesley.

In addition, claim 21 depends from claim 19, and Gupta cannot make up for the deficiencies of Wesley with regard to claim 19.

For at least the above reasons, claim 21 is not rendered obvious by the combination of references the Office Action proposes.

Obviousness rejection based on Wesley in view of Gupta

Claim 23

Claim 23 depends from claim 19.

Gupta cannot make up for the shortcomings of Wesley.

For at least this reason, claim 23 is deemed to distinguish patentably over the combination of references the Office Action applies.

Obviousness rejection based on Wesley in view of Gupta

Claim 37

Claim 37 depends from claim 33, and Gupta cannot make up for the shortcomings of Wesley.

The Office Action commentary on page 14 does not relate to the language of claim 37.

In addition, since claim 37 recites the same above-quoted language of claim 7, it is likewise deemed to be patentable.

Obviousness rejection based on Wesley in view of Gupta

Claim 16

Claim 16 depends from claim 9, and is deemed to be patentable by virtue of its dependency.

In addition, claim 16 recites, ". . . said steps of increasing and decreasing said sender rate above and below an operating point for said network provide a maximum throughput at minimum delay time."

This Office Action cites to Gupta, but the cited passage does not disclose or suggest the underlined aspect in the above quotation from the present claim 16.

For at least the above reasons, claim 16 distinguishes patentably over the applied references.

Obviousness rejection based on Wesley in view of Gupta and Ghanwani

Claims 4 and 29

Claims 4 and 29 depend from base claims 1 and 26, respectively. Ghanwani relates to flow control but cannot make up for the shortcomings in the other references.

In addition, claim 4 recites, ". . . increasing said sender rate non-linearly; and, returning said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network."

The Office Action seemingly acknowledges that Wesley and Gupta, alone and in combination, fail to disclose or suggest the above-quoted aspect of claim 4, but incorrectly suggests that Ghanwani makes up the difference.

The Office Action refers, first, to the formula, in Ghanwani, "r(next) = r(present) = I" (col. 5, line 42). This formula states that the next sender rate is equal to the current sender rate plus a rate increase control parameter, I. This parameter for short connections between the sender and the particular receiver is I(s); for long connections it is I(l). The rate increase control parameter "is generally chosen to obtain acceptable

performance, the asymptotic/goal rate 'r(A)' for the sender, and an initial sending rate 'r(0)' (col. 4, lines 49-52)." In the context of the above formula, I(s) is equal to the I(l) multiplied by the quotient of the short inter-node length l(s) divided by the long inter-node length l(l) (col. 5, line 42-48). The above-described Ghanwani formula relates to a linear increase in sender rate (col. 5, line 36), and that Ghanwani also discusses an exponential rate increase function (col. 4, line 62). In the Ghanwani exponential rate increase function, "the increase factor is related to the quantity of the asymptotic rate less the present rate. . ." (col. 4, lines 65-67).

The Office Action then offers the following conclusion in the last full sentence of page 15:

"Thus, based on the formula, the sender rate is increased by a specified amount at which the source node is currently transmitting the data."

Firstly, the appellant is unable to see how this conclusion is reached, based on the above information.

Secondly, the appellant is unable to understand how the conclusion would serve to support the proposition the Office Action presumably is advancing, i.e., that Ghanwani can reasonably be construed as disclosing or suggesting the language particular to the present claim 4.

The Office Action also concludes that "eventually the rate adjustment will be done according to a linear rate change function." However, the Office Action does not explain on what basis it reaches this conclusion. Nor would such a conclusion, even if it were to be deemed reasonable, accord Ghanwani but the slightest step toward resembling the present claim 4.

The appellant believes that Ghanwani fails to disclose or suggest at least any and all of the following:

a) ". . . increasing said sender rate non-linearly; and, returning said sender rate to a linear rate. . .";

b) ". . . when a predetermined percentage of said bandwidth is utilized within said network;" and

c) ". . . increasing said sender rate non-linearly; and, returning said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network."

For at least all of the above reasons, the combination of references the Office Action proposes fails to render obvious the present invention as recited in claim 4.

Claim 29, which depends from claim 26, recites the same above-quoted language, and is likewise deemed to be patentable.

Obviousness rejection based on Wesley in view of Gupta and Ghanwani

Claim 11

Claim 11 depends from claim 9, and Ghanwani cannot make up for the shortcomings of the other references.

In addition, claim 11 recites the same language set forth above with regard to claim 4, and is likewise deemed to be patentable.

Obviousness rejection Wesley in view of Gupta and the "AAAPA"

Claims 6 and 31

Claim 6 recites, ". . .(e) adjusting said sender rate of said source node according to a second function if congestion occurs. . . the step (e) further comprises, in

calculating said second function, calculating said sender rate raised to a power exceeding unity."

The first above-quoted clause is in parent claim 1, and the second clause appears in the language particular to dependent claim 6.

The Office Action cites to pages 2 and 3 of the instant specification, and to equations 3, for disclosure of , ". . . said sender rate raised to a power exceeding unity."

The Office Action is incorrect.

Firstly, as to equations 3, they do not disclose or suggest ". . . said sender rate raised to a power exceeding unity."

Equations 3 consist of a decrease function and an increase function. The decrease function is shown (specification, page 3, line 10) as the function on top, and the increase function is shown immediately underneath the decrease function.

If "congestion occurs," the decrease function is chosen (specification, page 1, line 21 - page 2, line 1; page 2, lines 5-16; page 5, lines 19-21: "Summary of the Invention").

It follows that the decrease function in equation 3, i.e., the top function, may serve as the "second function" in step (e) of the parent claim to claim 6, i.e., claim 1.

The decrease function, i.e., f_D (equation 3), is defined on the variable x, which is raised to the power *l* (shown here in italics for readability).

The variable x represents "said sender rate" (specification, page 2, line 11).

Advantageously in the present invention, quicker convergence to fairness is achievable if *l*, i.e., the power to which "said sender rate" is raised, is made to exceed unity (page 9, line 18: "$l>1$"; page 10, lines 16-17).

According to the prior art, by contrast, the power *l*, i.e., the power to which the sender rate is raised, cannot (page 9, line 16: "cannot") exceed unity (see also, page 9, lines 21-22).

Secondly, as to the suggestion by the Office Action that pages 2 and 3 of the instant specification disclose ". . . said sender rate raised to a power exceeding unity," this suggestion by the Office Action is incorrect.

Pages 2 and 3 of the instant specification likewise indicate that, in the prior art, the sender rate is raised to a power not exceeding unity (e.g., page 3, lines 13-14). Nothing else said on pages 2 and 3 suggests otherwise.

For at least the above reasons, the AAAPA does not disclose or suggest, ". . . in calculating said second function, calculating said sender rate raised to a power exceeding unity."

Also, claim 6 depends from claim 1, and Gupta cannot make up for the shortcomings of Wesley.

The appellant submits that the applied references, alone or in combination, fail to disclose, suggest or feature, ". . . in calculating said second function, calculating said sender rate raised to a power exceeding unity."

For at least the above reasons, the instant ground of rejection is deemed to be invalid.

Claim 31, which depends from claim 26, recites the same above-quoted language of claim 6, and is likewise deemed to be patentable.

Obviousness rejection Wesley in view of Gupta and the "AAAPA"

Claim 12

Claim 12, which depends from claim 9, and Gupta cannot make up for the shortcomings of Wesley.

In addition, since claim 12 recites the same above-quoted language of claim 6, it is likewise deemed to be patentable.

Obviousness rejection Wesley in view of Gupta and the "AAAPA"

Claim 24

Claim 24 depends from claim 19, and Gupta cannot make up for the shortcomings of Wesley.

In addition, since claim 24 recites the same above-quoted language of claim 6, it is likewise deemed to be patentable.

Obviousness rejection Wesley in view of Gupta and the "AAAPA"

Claims 7 and 32

Claim 7 recites, ". . . (d) adjusting a sender rate at which said source is currently transmitting the data according to a first function of the determined bandwidth capacity if no congestion occurs. . . the step (d) further comprises, in calculating said first function, calculating said sender rate raised to a power <u>exceeding unity</u>."

The first above-quoted clause is in parent claim 1, and the second clause appears in the language particular to dependent claim 7.

The Office Action cites to pages 2 and 3 of the instant specification, and to equations 3, for disclosure of the claim 7 language ". . . exceeding unity."

The Office Action is incorrect.

Firstly, as to equations 3, they so not disclose or suggest ". . . exceeding unity."

Equations 3 consist of a decrease function and an increase function. The decrease function is shown (specification, page 3, line 10) as the function on top, and the increase function is shown immediately underneath the decrease function.

If "no congestion occurs," the increase function is chosen (specification, page 1, line 21 - page 2, line 2; page 2, lines 5-16; page 5, lines 17-19: "Summary of the Invention").

It follows that the increase function in equation 3, i.e., the top function, may serve as the "first function" in step (d) of the parent claim to claim 7, i.e., claim 1.

The increase function, i.e., f_I (equation 3), is defined on the variable x, which is raised to the power $-k$ (shown here in italics for readability).

The variable x represents "said sender rate" (specification, page 2, line 11).

Advantageously in the present invention, "better scalability" (page 10, line 5: "better scalability") is achievable if $l+2k+1=0$ (page 10, lines 8-9) and $l>1$ (page 10, lines 14-15; page 10, line 16 - page 11, line 6). Mathematically, this implies that $-k>1$, i.e., $-k$ is greater than unity (see also, page 10, lines 16-17). Referring again to the increase function f_I in equation 3, it is raised to the power $-k$. Thus, the sender rate is raised to a power greater than unity.

It follows that the present invention features, "in calculating said first function, calculating said sender rate raised to a power exceeding unity."

The prior art of record, by contrast, alone or in combination, fails to disclose, suggest or feature, "in calculating said first function, calculating said sender rate raised to a power exceeding unity." (see present specification, page 10, lines 6-8: "$k=1$" which implies that $-k$ is less than unity).

Secondly, as to pages 2 and 3 of the specification, nothing that appears on these two pages discloses or suggests that $-k$, in the prior art, is greater than unity.

Also, claim 7 depends from claim 1, and Gupta cannot make up for the shortcomings of Wesley.

For at least the above reasons, the AAAPA does not disclose or suggest, "in calculating said first function, calculating said sender rate raised to a power exceeding unity."

The appellant submits that the applied references, alone or in combination, fail to disclose, suggest or feature, "in calculating said first function, calculating said sender rate raised to a power exceeding unity."

For at least the above reasons, the instant ground of rejection is deemed to be invalid.

Claim 32, which depends from claim 26, recites the same above-quoted language of claim 7 and is likewise deemed to be patentable.

Obviousness rejection Wesley in view of Gupta and the "AAAPA"

Claim 13

Claim 13, which depends from claim 9, and Gupta cannot make up for the shortcomings of Wesley.

In addition, since claim 13 recites the same above-quoted language of claim 6, it is likewise deemed to be patentable.

Obviousness rejection Wesley in view of Gupta and the "AAAPA"

Claim 35

Claim 35 depends from claim 33, and Gupta cannot make up for the shortcomings of Wesley.

In addition, since claim 33 recites the same above-quoted language of claim 6, it is likewise deemed to be patentable.

Obviousness rejection Wesley in view of Gupta and the "AAAPA"

Claims 17 and 38

Claims 17 and 38 both recite, "l represents a constant value greater than one; and, the value m ranges between $2 \leq m \leq 8$."

As set forth above with regard to claim 6, the applied references, alone or in combination, fail to disclose or suggest "l represents a constant value greater than one."

In addition, the appellant submits that the applied references, alone or in combination, fail to disclose or suggest "the value m ranges between $2 \leq m \leq 8$."

The inventive use of parameters is discussed in the instant specification (e.g., page 11, line 17 - page 12, line 17).

The Office Action seems to assume claim 17 and 38 are "in the prior art," but cites no support or authority for such a proposition whatsoever.

Obviousness rejection Wesley in view of Gupta and the "AAAPA"

Claims 18 and 39

Claims 18 and 39 both recite, " k represents a constant value less than negative one; and, the value D ranges between $5 \leq D \leq 20$."

As set forth above with regard to claim 7, the applied references, alone or in combination, fail to disclose or suggest " k represents a constant value less than negative one."

In addition, the appellant submits that the applied references, alone or in combination, fail to disclose or suggest "the value D ranges between $5 \leq D \leq 20$."

The inventive use of parameters is discussed in the instant specification (e.g., page 11, line 17 - page 12, line 17).

The Office Action seems to assume claim 18 and 39 are "in the prior art," but cites no support or authority for such a proposition whatsoever.

CONCLUSION

In view of the above analysis, it is respectfully submitted that the referenced teachings, whether taken individually or in combination, fail to anticipate or render obvious the subject matter of any of the present claims. Therefore, reversal of all outstanding grounds of rejection is respectfully solicited.

Respectfully submitted,
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VIII. CLAIMS APPENDIX

1. (previously presented) A method for providing congestion control in a communications network, the method comprising the steps of:

(a) transmitting a plurality of serial data transmission from a source node to a destination node;

(b) determining whether a congestion occurs in said network;

(c) determining a bandwidth capacity of said network;

(d) adjusting a sender rate at which said source is currently transmitting the data according to a first function of the determined bandwidth capacity if no congestion occurs; and,

(e) adjusting said sender rate of said source node according to a second function if congestion occurs.

2. (previously presented) The method of claim 1, wherein said adjusting step (d) according to said first function includes increasing the number of packets transmitted by said source node.

3. (previously presented) The method of claim 1, wherein said adjusting step (e) according to said second function includes decreasing the number of packets transmitted by said source node.

4. (previously presented) The method of claim 1, wherein said adjusting step (d) according to said first function comprises the steps of:

increasing said sender rate non-linearly; and,

returning said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network.

5. (previously presented) The method of claim 1, wherein said second function varies with said determined bandwidth capacity.

6. (previously presented) The method of claim 1, wherein the step (e) further comprises, in calculating said second function, calculating said sender rate raised to a power exceeding unity.

7. (previously presented) The method of claim 1, wherein the step (d) further comprises, in calculating said first function, calculating said sender rate raised to a power exceeding unity.

8. (original) The method of claim 1, wherein said data flow from said source node is simultaneously transmitted to multiple destination nodes, and said bandwidth capacity is determined for each said data flow transmitted to each of said multiple destination nodes.

9. (previously presented) A method for providing congestion control in a communications network, the method comprising the steps of:

(a) transmitting a plurality of serial data transmission from a source node to a destination node;

(b) monitoring a sending rate at which said source node is currently transmitting data to said network and a current rate at which said destination node is currently receiving data to determine whether a congestion state occurs;

(c) if no congestion state occurs, determining the bandwidth capacity of said network and increasing said sender rate of said source node according to a first function of the determined bandwidth capacity; and,

(d) if a congestion state occurs, decreasing said sender rate of said source node according to a second function.

10. (previously presented) The method of claim 9, wherein said second function varies with said determined bandwidth capacity.

11. (previously presented) The method of claim 9, wherein said increasing step according to said second function comprises the steps of:

increasing said sender rate non-linearly; and,

returning said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network.

12. (previously presented) The method of claim 9, wherein said decreasing further comprises, in calculating said second function, calculating said sender rate raised to a power exceeding unity.

13. (previously presented) The method of claim 9, wherein said increasing further comprises, in calculating said first function, calculating said sender rate raised to a power exceeding unity.

14. (original) The method of claim 9, wherein said data flow from said source node is simultaneously transmitted to multiple destination nodes, and said bandwidth capacity is determined for each said data flow transmitted to each of said multiple destination nodes.

15. (original) The method of claim 9, wherein a congestion state occurs if the rate permitted by said destination node exceeds the capacity of said source node.

16. (original) The method of claim 9, wherein said steps of increasing and decreasing said sender rate above and below an operating point for said network provide a maximum throughput at minimum delay time.

17. (previously presented) The method of claim 9, wherein the step of decreasing said sender rate (fD (x_i)) according to said second function includes calculating the equations:

$$x_{i+1} = x_i - \beta x^{l} \quad \text{and} \quad \beta = 1 / \ mC^{l-1},$$

wherein x_{i+1} represents a next sending rate of data; x_i represents the current sending rate during cycle i; C represents the determined bandwidth capacity of said

network, l represents a constant value greater than one; and, the value m ranges between $2 \leq m \leq 8$.

18. (previously presented) The method of claim 9, wherein the step of decreasing said sender rate according to said first function includes calculating the equations:

$$x_{i+1} = x_i + \alpha x^{-k} \quad \text{and}$$

$$\alpha = \frac{C^{k+1}}{D},$$

wherein x_{i+1} represents a next sending rate of data; x_i represents the current sending rate during cycle i; C represents the determined bandwidth capacity of said network, k represents a constant value less than negative one; and, the value D ranges between $5 \leq D \leq 20$.

19. (previously presented) A system for providing congestion control in a communications network by adjusting a sender rate between at least one sender node and destination node, comprising:

means for transmitting a plurality of data transmission from said source node to said destination node;

means for determining a bandwidth capacity of said network;

means for generating congestion feedback information based on the determined bandwidth capacity of said network to determine a congestion state; and,

means for adjusting said sender rate at which said source node is currently transmitting the data based on said congestion feedback information, the adjusted rate being a function of said determined bandwidth capacity of said network.

20. (previously presented) The system of claim 19, further comprising means for utilizing said congestion feedback information to determine a congestion state in said network.

21. (original) The system of claim 19, wherein said generating means comprise means for monitoring said sending rate at which said source node is currently transmitting data to said network and a current rate at which said destination node is currently receiving data to generate said congestion control information.

22. (previously presented) A system for providing congestion control in a communications network by adjusting a sender rate between at least one sender node and destination node, comprising:

means for transmitting a plurality of data transmission from said source node to said destination node;

means for determining a bandwidth capacity of said network;

means for generating congestion feedback information based on the bandwidth capacity of said network to determine a congestion state; and,

means for adjusting said sender rate at which said source node is currently transmitting the data based on said congestion feedback information, the bandwidth

capacity of said network, wherein, if no congestion occurs, said adjusting means increase the number of packets transmitted by said source node at a first rate and at a second rate if a predetermined range of the bandwidth capacity of said network is utilized.

23. (original) The system of claim 19, wherein said adjusting means decrease the number of packets transmitted by said source node at a predetermined rate if congestion occurs.

24. (previously presented) The system of claim 19, wherein said adjusting means includes calculating, in evaluating said function, said sender rate raised to a power exceeding unity.

25. (original) The system of claim 19, wherein said congestion feedback information is provided by at least one of said source node and said destination node.

26. (previously presented) A system for providing a congestion control in a communications network by adjusting the sender rate between a sender node and a destination node, comprising:

a memory for storing a computer-readable code; and,

a processor operatively coupled to said memory, said processor configured to:

(a) transmit a plurality of serial data transmissions from said source node to said destination node;

(b) determine whether a congestion state occurs in said network;

(c) determine a bandwidth capacity of said network;

(d) adjust said sender rate at which said source node is currently transmitting the data according to a first function of the determined bandwidth capacity if no congestion occurs; and,

(e) adjust said sender rate of said source node according to a second function if congestion occurs.

27. (previously presented) The system of claim 26, wherein said adjusting step (d) according to said first function includes increasing the number of packets transmitted by said source node.

28. (previously presented) The system of claim 26, wherein said adjusting step (e) according to said second function includes decreasing the number of packets transmitted by said source node.

29. (previously presented) The system of claim 26, wherein said adjusting step (d) according to said first function comprises the steps of:

increasing said sender rate non-linearly; and,

returning said sender rate to a linear rate when a predetermined percentage of said bandwidth is utilized within said network.

30. (previously presented) The system of claim 26, wherein said adjusting step (e) according to said second function varies with said determined bandwidth capacity.

31. (previously presented) The system of claim 26, wherein the step (e) further comprises calculating, in calculating said second function, said sender rate raised to a power exceeding unity.

32. (previously presented) The system of claim 26, wherein the step (d) further comprises calculating, in calculating said first function, said sender rate raised to a power exceeding unity.

33. (previously presented) A machine-readable medium having stored thereon data representing sequences of instructions, and the sequences of instructions which, when executed by a processor, cause the processor to:

transmit a plurality of serial data transmissions from a source node to a destination node;

monitor a sending rate at which said source node is currently transmitting data to said network and a current rate at which said destination node is currently receiving data to determine whether a congestion state occurs; (c) if no congestion state occurs, determine the bandwidth capacity of said network and increase said sender rate of said source node according to a first function of the determined bandwidth capacity; and,

(d) if a congestion state occurs, decrease said sender rate of said source node according to a second function.

34. (original) The machine-readable medium of claim 33, wherein said increase and decrease of said sender rate operate to establish a maximum data transmission rate and constant packet loss.

35. (previously presented) The machine-readable medium of claim 33, wherein the decreasing further comprises, in calculating said second function, calculating said sender rate raised to a power exceeding unity.

36. (original) The machine-readable medium of claim 33, wherein said data flow from said source node is simultaneously transmitted to multiple destination nodes, and said bandwidth capacity is determined for each said data flow transmitted to each of said multiple destination nodes.

37. (previously presented) The machine-readable medium of claim 33, wherein the increasing further comprises, in calculating said first function, calculating said sender rate raised to a power exceeding unity.

38. (previously presented) The machine-readable medium of claim 33, wherein the step of decreasing said sender rate ($f_D(x_i)$) according to said second function includes calculating the equations:

$x_{i+1} = x_i - \beta x^l$ and $\beta = 1 / mC^{l-1}$,

wherein x_{i+1} represents a next sending rate of data; x_i represents the current sending rate during cycle i; C represents the determined bandwidth capacity of said network, l represents a constant value greater than one; and, the value m ranges between $2 \leq m \leq 8$.

39. (previously presented) The machine-readable medium of claim 33, wherein the step of decreasing said sender rate according to said first function includes calculating the equation:

$$x_{i+1} = x_i + \alpha x^{-k} \quad \text{and}$$

$$\alpha = \frac{C^{k+1}}{D},$$

wherein x_{i+1} represents a next sending rate of data; x_i represents the current sending rate during cycle i; C represents the determined bandwidth capacity of said network, k represents a constant value less than negative one; and, the value D ranges between $5 \leq D \leq 20$.

40. (previously presented) A congestion controller disposed at a source node for a network, said source node being configured for currently transmitting the data toward a destination node at a sender rate that is controlled by said controller, and that is

dictated by a first function of a currently determined bandwidth capacity of said network if it is determined that no congestion is occurring in said network, said controller being =configured for adjusting a rate for currently transmitting said data toward said destination node according to a second function if the determination is that congestion is occurring in said network.

IX. EVIDENCE APPENDIX

The appellant is unaware of any evidence.

X. RELATED PROCEEDING APPENDIX

The appellant is unaware of any related proceeding.